

REMARKS

In the Office Action dated June 10, 2010 and marked final, the Examiner rejects claims 1-19 under 35 U.S.C. §103(a). Claims 1, 7, 11-14, 18 and 19 have been amended. Following entry of this Amendment, claims 1-19 remain pending. Applicant respectfully requests reconsideration of the Application in light of the amendments and remarks herein.

Response to rejections under 35 U.S.C. § 103(a)

The Examiner rejects claims 1-19 under 35 U.S.C. §103(a) as being unpatentable over Nagaoka et al. (JP 2002-005656) and Watanabe et al. (US 7,620,237).

Claim 1 (and claims 2-6 dependent therefrom) recites in part an apparatus for detecting a position of an object in one or more images captured by an image pickup device mounted on a vehicle comprising: (a) a memory configured to store a plurality of images captured by the image pickup device, wherein the image pickup device is a single camera, including a first image of an object taken at a first time by the single camera and a second image of the object captured at a second time by the single camera; and (b) a controller operatively coupled to the memory and configured to determine from the first image taken at the first time the object position when an image acceleration is zero and a first pitch angle of the vehicle relative to a y-coordinate in a horizontal direction is zero, and to determine from the second image whether a second pitch angle of the vehicle relative to the y-coordinate in the horizontal direction at the second time is zero, and to determine the position of the object in the second image based on the position of the object in the first image if the second pitch angle is not zero.

Claim 7 (and claims 8-12 dependent therefrom) recites in part a vehicle comprising: (a) a memory on which is stored the plurality of images captured by the image pickup device, wherein the image pickup device is a single camera, including a first image of the at least one object taken by the single camera at a first time when a first pitch angle of the vehicle relative to a y-coordinate in a horizontal direction is zero and an image acceleration is zero and a second image of the at least one object captured by the single camera at a second time; and (b) a controller operatively coupled to the memory and configured to determine a position of the at least one object in the first image and to determine from the first image whether a second pitch angle of the vehicle in the second image at the second time is zero, and to determine a position of the at least one object in the

second image based on the position of the at least one object in the first image if the second pitch angle is not zero.

Claim 13 recites in part an apparatus for detecting a position of an object in one or more images captured by a single camera in a vehicle, comprising: (a) image judgment means for determining whether an image of the object captured by the single camera was captured when a pitch angle of the vehicle relative to a y-coordinate in a horizontal direction was zero and an image acceleration was zero; and (b) object position computing means for determining a position of the object in a first image captured by the single camera if the first image was captured when the first pitch angle of the vehicle was not zero, which determination is based on a position in a second image of the same object that was captured by the single camera when a pitch angle of the vehicle was zero and an image acceleration of the second image was zero.

Claim 14 (and claims 15-19 by their dependency) recites a method for detecting a position of an object in one or more images captured by an image pickup device mounted on a vehicle. The method comprises storing a plurality of images captured by the image pickup device, wherein the image pickup device is a single camera, determining a pitch angle of the vehicle in each of the plurality of images, an image captured by the single camera and having a first pitch angle of zero being a first image, determining a position of the object in the first image, determining whether a second image of the object captured by the single camera was captured when a second pitch angle of the vehicle relative to a y-coordinate in a horizontal direction was zero and determining the position of the object in the second image if the second image was captured when the second pitch angle of the vehicle was not zero, which determination is based on the first image of the same object that was captured when the pitch angle of the vehicle was zero.

Each of these claims recites the use of a single camera clearly described as camera 1 in the specification. Each of these claims clearly states that all of the calculations are based on images taken by that single camera.

Nagaoka et al. fails to disclose the use of a single camera. Nagaoka et al. requires two cameras, 1R and 1L. The cameras are arranged symmetric with respect to the longitudinal central axis of the vehicle. ([0009]). By the right image and the left image, since the horizontal position on the screen of the same object shifts and is displayed, the distance to that object is computable with this gap (parallax). ([0011]).

As noted by the Examiner on page 4 of the Office Action, Nagoako et al.

fails to disclose a controller coupled to the memory and the pitch angles of the vehicle in reference to the y-coordinate in a horizontal direction being different from zero.

Watanabe et al., like Nagoako et al., fails to teach or suggest the use of a single image pickup device, as taught by Applicants. Watanabe discloses a night vision system that requires a pair of cameras 16R and 16L, a speed sensor 22, a yaw rate sensor 24 and a solar radiation sensor 26. An ECU 13 processes two infrared images obtained by the cameras to detect heat source objects. (Col. 3, ll. 36-38). Both cameras provide infrared images to the image input unit 40. The Examiner refers on page 4 to the Abstract, which clearly states that two aiming targets are arranged at positions that are away from two infrared cameras by a predetermined distance. This has nothing to do with Applicant's claimed subject matter, which uses one camera for an object that is at a determined distance, not a predetermined distance.

The Examiner contends that Watanabe et al. clearly discloses a controlling of the pitch angle as disclosed by Applicant. However, Watanabe et al. discloses an aiming mode execution unit 48 that is required to coordinate the two cameras so that the information obtained from the cameras is useful. The unit 48 has a manufacturing plant mode unit 70 for performing the aiming process with an aiming target control apparatus 100 (see FIG. 3) as the external computer system in the manufacturing plant in which the vehicle 12 is manufactured, and a service mode unit 72 for performing the aiming process with a service aiming adjustment apparatus 120 (see FIG. 4) as the external computer system in a service factory or the like. (Col. 4, ll. 16-24). This entire process is only preformed because of the use of two cameras, which is not required by Applicant as only one camera is used. "A camera image distortion correcting unit 82 for correcting image distortions caused due to individual differences as to focal lengths, pixel pitches, etc. *between the infrared cameras 16 R, 16 L*, a camera mounting angle calculating unit 84 for calculating respective mounting angles (a pan angle and a pitch angle) of *the infrared cameras 16 R, 16 L*, a camera image clipping coordinate calculating unit 86 for calculating clipping coordinates used as a reference for clipping processed ranges from images, and a parallax offset value calculating unit 88 for calculating a parallax offset value as an error which is contained in the parallax between object images *because the optical axes of the infrared cameras 16 R, 16 L are not parallel to each other.*" (Col. 4, ll. 25-45). This entire process of Watanabe et al. is not relevant to Applicant's recited subject matter as only one camera is used.

Both Nagoako et al. and Watanabe et al. require the use of two cameras. Neither reference suggests determining from images taken from a single camera at different times the object position when an image acceleration is zero and a first pitch angle of the vehicle relative to a y-coordinate in a horizontal direction is zero, determining from the second image whether a second pitch angle of the vehicle relative to the y-coordinate in the horizontal direction at the second time is zero, and determining the position of the object in the second image based on the position of the object in the first image if the second pitch angle is not zero. The calculation of the parallax offset value in step S22 to which the Examiner refers is performed in the Aiming mode execution unit, as shown in FIG. 2, which is irrelevant to Applicant's disclosed subject matter as only one camera is used, making obsolete the issue of having two cameras not in parallel.

One skilled in the art would not find in Watanabe et al. the use of a single camera to determine the position of the object in the second image based on the position of the object in the first image if the second pitch angle is not zero, as this is not taught or suggested in Watanabe et al. Furthermore, one skilled in the art would not look to the teachings of Watanabe et al. as Watanabe et al. teaches in great detail how to correct for unparallel cameras, which is not an issue with Applicant's use of a single camera. Nagoako et al. also uses two cameras and requires a plurality of objects. Accordingly, the combination of Nagoako et al. and Watanabe et al. fails to render obvious to one skilled in the art the subject matter of claims 1-19. Applicant submits that this renders these claims allowable over the cited art.

Conclusion

It is respectfully submitted that this Amendment overcomes all of the Examiner's objections and rejections to the application as originally filed. Applicant submits that no new matter is added to the Application as filed. Reconsideration of the Application as amended is requested. It is respectfully submitted that this Amendment places the Application in suitable condition for allowance; notice of which is requested.

The Examiner is invited to contact the undersigned at the telephone number listed below if the Examiner believes an Examiner's amendment would expedite prosecution of the application.

Respectfully submitted,

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A handwritten signature in cursive script, appearing to read "Francine Nesti", written over a horizontal line.

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